CALIPSO Quality Statements Summary: Lidar Level 2 Vertical Feature Mask (VFM)

Lidar Level 2 Vertical Feature Mask (VFM) Information Half orbit (Day) geolocated data radiances					
Release Date	**Version**	**Data Date Range**	**Product Quality Statement**	**Detailed Quality Statement**	**Maturity Level**
December 2011	3.02	November 1, 2011 to present	3.02 Version Summary	QS 3.01, 3.02	• Validated Stage 1
May 2010	3.01	June 13, 2006 to February 16, 2009 March 17, 2009 to October 31, 2011	3.01 Version Summary	QS 3.01, 3.02	• Validated Stage 1
October 2008	2.02	September 14, 2008 to October 29, 2009	2.02 Version Summary	QS 2.01, 2.02	• Provisional
January 25, 2008	2.01	June 13, 2006 to September 13, 2008	2.01 Version Summary		• Layer Heights - Provisional • Aerosol/Cloud /Stratospheric Classifications - Beta
December 8, 2006	1.10	June 13, 2006 to November 11, 2007	1.10 Version Summary	QS 1.10	• Layer Heights - Provisional • Aerosol/Cloud /Stratospheric Classifications - Beta

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Data Release Date: December 2011
Version: 3.02
Data Date Range: November 1, 2011 to present

The CALIPSO Team is releasing Version 3.02 which represents a transition of the Lidar, IIR, and WFC processing and browse code to a new cluster computing system. No algorithm changes were introduced and very minor changes were observed between V 3.01 and V 3.02 as a result of the compiler and computer architecture differences. Version 3.02 is being released in a forward processing mode beginning November 1, 2011.

Data Release Date: May 2010
Version: 3.01
Data Date Range: June 13, 2006 to February 16, 2009 and March 17, 2009 to October 31, 2011

The CALIOP Lidar Level 2 Vertical Feature Mask (VFM) data product consists of a sequence of altitude registered bit-mapped integers, with one 16-bit integer being recorded for each range resolution element in the level 0 lidar data downlinked from the CALIPSO satellite. Decoding the bits in the individual integers yields information on feature type (e.g., cloud, aerosol, or clear air) and subtype (e.g., water cloud or ice cloud) at each location. Information about cloud thermodynamic phase, and the amount of horizontal averaging required for detection is also included, as are quality assessments for all classification decisions. The product maturity level of the version 3 VFM is designated as *Validated Stage 1*, meaning that reliability of the parameters therein has been verified using independent measurements at selected locations and times. No new parameters have been added for the version 3 VFM product. However, the interpretation assigned to the bits describing cloud ice-water phase has changed slightly from version 2. These changes are described fully in the vertical feature mask Detailed Quality Statement.

Data Release Date: October 2008
Version: 2.02
Data Date Range: September 14, 2008 to October 29, 2009

Please refer to the Data Detailed Quality Statement for information about this release.

Data Release Date: January 25, 2008
Version: 2.01
Data Date Range: June 13, 2006 to September 13, 2008

Please refer to the Data Detailed Quality Statement for information about this release.

Data Release Date: December 8, 2006
Version: 1.10
Data Date Range: June 13, 2006 to November 11, 2007

The CALIPSO vertical feature mask (VFM) data product reports a single 16-bit integer for each lidar altitude resolution element in the data stream downlinked from the satellite. Upon decoding each of these bit-mapped integers, users will obtain information describing layer location (both vertically and horizontally), layer type, and the amount of horizontal averaging required for the layer to be detected. Given the accuracy of the CALIPSO altitude registration, the layer locations reported in the VFM appear to be quite accurate. In optically dense layers, the lowest altitude where signal is observed is reported as the base. In actuality, this point may lie well above the true base. In this release, the layers which are reported represent a choice in favor of high reliability over maximum sensitivity. Weakly scattering layers sometimes will go unreported, in the interest of minimizing the number of false positives.

A preliminary version of the algorithm to discriminate cloud and aerosol has been used in this release. Overall, the algorithm performance is fairly good at labeling cloud as cloud and somewhat less successful in labeling aerosol as aerosol. Several types of misclassifications are fairly common and should be watched for. The most common misclassification is portions of dense aerosol layers being labeled as cloud. The algorithm operates on individual profiles, so small regions within an aerosol layer are sometimes labeled as cloud. These misclassifications are often apparent from study of Level 1 browse images. Actual clouds occurring within aerosol layers appear to be correctly classified as cloud most of the time. Additionally, portions of the bases of some cirrus clouds are mislabeled as aerosol, and some tropospheric polar clouds are erroneously labeled as aerosol. Improvements to the cloud/aerosol discrimination algorithm are underway and misclassifications should be greatly reduced in future data releases.